

THE DIETARY DATA COLLECTION SYSTEM -- AN AUTOMATED INTERVIEW AND CODING SYSTEM FOR NHANES III

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PART I

The National Health and Nutrition Examination Survey III;
presented by Margaret McDowell, M.P.H., National Center for Health Statistics

The third National Health and Nutrition Examination Survey (NHANES III), is a national survey conducted by the National Center for Health Statistics (NCHS) of the U.S. Public Health Service. The purpose of the Survey is to assess the health and nutritional status of children and adults living in the United States. Data collection began in October, 1988, and will continue for the next six years. Approximately 40,000 individuals two months of age and older are expected to participate in the Survey. Data collection methods for NHANES III include detailed interviews, physical and dental examinations, and laboratory tests. The final list of examination components, and the procedures used to obtain these data, are the result of extensive planning and pilot testing.

The nutrition assessment tools used in the Survey will provide data for nutrition monitoring to assess the nutritional status of the population over time, reference data for nutritional biochemistries, anthropometric data, and nutrient intakes, and data for research to examine relationships between diet and health.¹ NCHS sponsored a workshop in 1986 to review dietary data collection methodologies which could be used in the Survey. Recommendations were made to continue collection of both food frequency and 24-hour recall data during NHANES III.

The decision to adopt an automated interactive interview methodology for the 24-hour recall component was a major change from earlier NHANES surveys. Previously, dietary recalls were recorded on hard copy and coded by the dietary interviewers. During NHANES III, approximately 30,000 dietary recalls will be collected on personal computers using the Dietary Data Collection system (DDC). The recalls are sent to the minicomputer system which is used for all data collection in the Mobile Examination Centers during NHANES III. Dietary data transmittals are mailed from the field to NCHS in computer tape format for editing and processing.

The University of Minnesota's Nutrition Coordinating Center (NCC) developed the prototype of the DDC system used during NHANES III with grant support from the National Cancer Institute. Later, funding from NCHS and the Food and Drug Administration was used to adapt the DDC for use in NHANES III based on NCHS specifications.

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The critical features of the NHANES III automated interactive dietary interview system identified by NCHS included the following:

- (1) ability to conduct open-ended interviews using structured probes to ensure standardized data collection;
- (2) ability to collect information on brand name products, ingredients, cooking methods, and the use of fat and sodium in food preparation;
- (3) ability to identify foods eaten together;
- (4) ability to information on the time of day food was eaten, the name of the meal or snack, and place where food was consumed;
- (5) ability to edit dietary recalls both during and after the dietary interview;
- (6) automated coding of foods to the USDA database;
- (7) ability to record new information about foods which are not currently in the system during the actual interview.

The DDC system was specifically adapted for the Survey based on these specifications. Representatives from the contracting agencies who have worked with NCHS to develop the DDC program and dietary interview procedures will talk about their agencies' roles. Rita Warren from the University of Minnesota will describe the DDC system and database maintenance. Diane Feskanich from Westat, Inc., will describe the dietary interviewer's role in using the DDC system to its maximum potential.

PART II

The Dietary Data Collection System and Nutrient Database;
presented by Rita A. Warren, M.S., R.D., Nutrition Coordinating Center, University of Minnesota

The primary purpose for developing an automated dietary data collection system related to the need for a standardized interview. The nutrition data system, which had been in place at the University of Minnesota since 1974, included three major components: the training of interviewers; centralized coding; and centralized data processing for nutrient calculations.² It was recognized that the least standardized component of the system was the dietary interview which was limited by the ability of the trained interviewer to remember a vast amount of detail for probing for food descriptions and preparation methods.

To address this need, an NIH proposal was developed which included an interactive interview for collecting dietary data at the level of detail required by diet-disease related research studies. This grant proposal was funded in 1984 by the National Cancer Institute (NCI). In addition to the main objective of standardizing the way dietary data are collected, a secondary objective of the proposed microcomputer based system was the capability of automating the coding.³ A further goal of the project was to provide a data collection system that could be used with any comprehensive nutrient database.

Following an open-house demonstration of the prototype system in May 1986, the DDC system was selected for use in the NHANES III. NCC nutritionists and computer scientists worked directly with the nutritionists and computer staff at the National Center for Health Statistics (NCHS) to customize and test the DDC system for the Survey.⁴ This included mapping the DDC foods database to the USDA's Nationwide Food Consumption Survey (NFCS) database which was chosen as the primary database for the Survey. Nutrient calculations and analysis of the data will be handled at the NCHS after all coding decisions have been made.

Database maintenance must be continued throughout the six years of the study. The DDC system must be routinely updated based on USDA updates for the USDA surveys (NFCS and CSFII). As NCHS processes Survey recalls, foods are identified which cannot be found in the system or which are captured in notes by the interviewers. These foods are then added to the database by NCC. New brand name foods which enter the market throughout the six years of the study will also be added to the database. As better data become available, such as improved recipes for Mexican-American foods, the database will be updated. This is important to NHANES III because of the oversampling of certain population groups, such as Hispanics. Likewise, NHANES III's focus on children as young as two months requires that special attention be focused on database maintenance of baby foods.

There are over 8000 "base" foods in the DDC system. Significantly more possibilities for classifying foods exist because of the way the food hierarchies are set up to collect detail on specificity. The DDC system collects detail for preparation methods (such as broiling, baking, panfrying meats, etc.), brand names, ingredient detail (such as mayonnaise in a potato salad or artificial sweeteners in beverages) and fat and sodium used in the preparation of the food. For example, there are over 9000 possibilities for variations on preparing meats. There are over 3000 possibilities for brand name listings. These three categories of foods alone -- the base foods plus the meat preparations and the brand name listings -- represent about 20,000 foods, but the possibilities are endless. By using variable ingredients such as type of fat, dairy products, meats, gravies, dressings, and frostings in recipes or combination foods, almost any food or food combination can be captured with the degree of detail needed by the Survey.

PART III

The Dietary Interviewer in NHANES III.
presented by Diane Feskanich, M.S., Westat, Inc.

Conducting the 24-hour recall is the major task of the dietary interviewer, but not the only task. After the interview is completed, the interviewer is required to review the recall for completeness and clarity and edit the recall using the DDC system. Notes may be added at this time to further document the interview. For example, the interviewer might add a Note to bran muffins, stating that the muffins were made with whole wheat flour instead of white flour. (See Attachment 1.) This Note would be reviewed at NCHS to determine whether the correct food codes were assigned.

Also during the edit process, any amount that was recorded as "unknown" during the interview may be changed to a default amount if a default standard exists for that food. For example, if a subject was unable to estimate the amount of blue cheese dressing that was on her hamburger, the interviewer would enter the quantity of dressing as "unknown". During editing, the interviewer would change this "unknown" entry to 1 TB based upon a default standard of 1 TB of dressing per sandwich. (See Attachment 1.)

The dietary interviewer is also responsible for gathering information from outside sources, such as babysitters, schools, or community feeding programs, when the respondent does not know what foods were consumed at one of the meals. This situation occurs most often with proxy interviews. For example, a mother might act as a proxy for her very young child, providing most of the information about what the child had to eat on the previous day. However, she might not know what was served for lunch at the day care center. In this case, the interviewer must attempt to contact the day care center and locate someone who can provide the information.

Interviewers also perform market checks to collect information about commercial foods not contained in the DDC system. The Missing Food screen is used to record as much detailed information about the food as the subject can provide during the interview. However, for commercially purchased foods, the interviewer is also instructed to find the food in the local grocery store and send the label information to NCHS for review.

All interviewers complete a comprehensive training course.⁵ The first few days of training focus on the general features of the DDC system and the microcomputer. Interviewers learn how to use the computer keyboard to enter information into the system.

The use of proper interviewing technique is emphasized during training. Interviewers must be able to elicit detailed information using neutral probes while maintaining a good rapport with the subject. They must also learn how to probe to ensure that all foods and beverages consumed are reported.

Training is designed to standardize the dietary interview as much as possible. The design of the DDC system itself provides a high degree of standardization by prompting the interviewer for all of the details required to describe and quantify a food. However, the interviewer is still responsible for selecting the best response to these prompts. The training sessions focus on training the interviewer to probe for and select the most appropriate choices from among those displayed on the DDC system screens.

For example, the DDC system will prompt the interviewer for the amount of an English muffin consumed by the subject. The system permits the interviewer to enter the quantity in terms of the dimensions of a cylinder or in terms of the number of standard sized English muffins consumed. Though it might be possible to ask the subject to describe the English muffin by its diameter and thickness if it is homemade, it is better not to ask the subject to estimate the dimensions of a commercially purchased English muffin. The DDC system contains information on the standard size of commercial English muffins, and this information is probably more accurate than the size estimates that can be provided by the subject.

Practice sessions and role-playing activities serve to improve the interviewer's confidence level, efficiency, and accuracy in using the DDC system. All dietary interviewers in NHANES III have training in foods and nutrition. But even experienced dietary interviewers must acquire some new skills to become proficient in the use of an interactive data collection system.

We have found that the best candidates for dietary interviewer training are those who have an education in dietetics, nutrition, or home economics, good interview skills, and some previous experience using a computer system and/or computer keyboard. After completing the training sessions and some initial experience using the DDC system in the field, the dietary interviewers in NHANES III have been able to conduct the 24-hour dietary recall interviews in about 20 - 30 minutes, depending upon the age of the subject, the complexity of the diet, and whether or not a proxy was used for the interview.

Several procedures are used in the field to monitor interviewer performance. Interviewers are observed during actual dietary interviews and are assessed on their use of the DDC system and the food models. They are also observed for use of neutral probes, appropriate mannerisms and eye contact, and the general flow of the interview. Continued monitoring is done through audio-taped interviews and general quality control analysis of 24-hour recall data.

As another form of quality control, approximately 10 percent of the dietary recalls are cross-checked between interviewers. Interviewers check one another's work for completeness, clarity, and accuracy. Any discrepancies between interviewers are sent to NCHS for resolution.

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